(d) The State Government of Kerala has approached for setting up of the Oceanarium at Kochi. The above information was communicated to State Government of Kerala.

Ocean and atmospheric science and technology cells in the Country

572. SHRIMATI N.P. DURGA: Will the Minister of EARTH SCIENCES be pleased to state:

(a) the details of universities where Ocean and Atmospheric Science and Technology cells are available in the country, State-wise;

(b) whether this Ministry is supporting Ocean and Atmospheric Science and capacity building programmes in the above universities;

(c) what research projects the Indian National Centre for Ocean Information Services, Hyderabad have undertaken during the last five years, year-wise; and

(d) the results thereof?

THE MINISTER OF EARTH SCIENCES (SHRI KAPIL SIBAL): (a) and (b) The Ministry of Earth Sciences has been implementing a programme on Marine Research and Capacity Building through a set of 9 Ocean Atmospheric Science and Technology Cells (OASTC), established in various universities/Institutes, which are located in 8 different States *viz.*, Berhampur University, Berhampur, Orissa; Bhavnagar University, Bhavnagar, Gujarat; Andhra University, Visakhapatnam, Andhra Pradesh; Cochin University of Science & Technology, Kochi, Kerala; Goa University, Goa; Annamalai University, Parangipettai, Tamil Nadu; Tamil University, Thanjavur, Tamil Nadu; Mangalore University, Mangalore, Karnataka and IIT, Kharagpur, West Bengal. Two Centres of Excellence (CoE) were established at Annamalai University, Parangipettai (Marine Biology) and at Goa University, Goa (Marine microbiology) which have now become full-fledged centres. The projects are being monitored by a Steering Committee and functioning of OASTC/CoEs in governed by the respective Management boards.

(c) and (d) The Indian National Centre for Ocean Information Services (INCOIS) has been implementing 3 basic research projects specifically in

the area of development of Ocean Atmospheric Modelling for the last 5 years *viz.*, Indian Ocean Modelling and Dynamics Studies (INDOMOD), Satellite Coastal Oceanographic research (SATCORE) and Indian Argo Project.

The INDOMOD project , being carried out by 10 reputed national institutes is designed primarily for development of a suite of wide range ocean-atmospheric models, specifically to address various aspects relating to (i) ocean and climate, (ii) Coastal ocean, (iii) hazardous weather events, (iv) Data assimilation and atlas (v) Observations for validation. Under the project, several experiments were conducted using Ocean and atmospheric General Circulation Models (GCMs) for understanding Indian Monsoon variability. Besides, sediment transport models were also customized for Hooghly and Gulf of Khambhat. As part of the programme, 3 current meter arrays were deployed along the equator (at longitudes 93 E, 83 E and 76 E) in the Indian Ocean and obtained valuable data for a period of 4 years and deployed over 60 drifters in the Bay of Bengal and the Arabian Sea for obtaining surface meteorological and upper ocean data. The results obtained from the project have been resulted into 90 international publications in the reputed Journals.

While under this SATCORE Project several regional algorithms were developed for retrieval satellite parameters (e.g. sea surface temperature, wind, waves chlorophyll, aerosol, water vapour and clouds) from both Indian and foreign satellite. Some of these parameters have already been implemented for the use for operational services at INCOIS.

Under the Indian Argo project, a high resolution Indian Ocean Model based on Modular Ocean Model (MOM) and a Regional Ocean Modelling System (ROMS) for the Indian Ocean have been set up.

Areas affected by global warming

†573. SHRI SHREE GOPAL VYAS:
SHRI VINAY KATIYAR:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the areas in India which may be adversely affected by global warming in the coming few years;

†Original notice of the question was received in Hindi.